

What is claimed is:

- 1        1.        An apparatus comprising:  
2                a primary information storage unit having a primary storage capacity;  
3                a secondary information storage unit to receive information stored in the primary  
4 information storage unit and the secondary information storage unit having a secondary  
5 storage capacity, the secondary storage capacity being less than the primary storage  
6 capacity; and  
7                an information processing unit coupled to the primary information storage unit  
8 and to the secondary information storage unit, the information processing unit to receive  
9 information from the secondary information storage unit, to process the information to  
10 form a transform of the information, and to store the transform in the primary information  
11 storage unit.
- 1        2.        The apparatus of claim 1, wherein the information processing unit includes a data  
2 selector unit coupled to the secondary information storage unit, a register unit, and a  
3 computational unit.
- 1        3.        The apparatus of claim 2, wherein the computational unit includes a butterfly unit.
- 1        4.        The apparatus of claim 3, wherein the butterfly is configurable as either a radix-2  
2 butterfly unit or a radix-4 butterfly unit.
- 1        5.        The apparatus of claim 3, wherein the butterfly is configurable as a radix-2  
2 butterfly unit and a radix-4 butterfly unit.
- 1        6.        The apparatus of claim 1, wherein the transform of the information comprises a  
2 Fourier transform of the information.

1       7.       The apparatus of claim 2, wherein the secondary information storage unit is to  
2 provide information blocks having a fixed length to the information processing unit.

1       8.       The apparatus of claim 2, wherein the secondary information storage unit is to  
2 provide a first stream of information blocks having a first fixed length and a second  
3 stream of information blocks having a second fixed length, the first fixed length being  
4 equal to, less than, or greater than the second fixed length.

1       9.       A signal bearing media encoded with machine-readable instructions, wherein the  
2 instructions when read and executed comprise:

3               partitioning data in a primary information storage unit into one or more fixed  
4 length blocks;

5               storing at least one of the one or more fixed length blocks in a secondary  
6 information storage unit;

7               processing the at least one of the one or more fixed length blocks using a butterfly  
8 computation to form processed information; and

9               storing the processed information in the primary information storage unit.

1       10.      The signal bearing media of claim 9, wherein processing the at least one of the  
2 one or more fixed length blocks using the butterfly computation to form the processed  
3 information comprises performing a radix-2 butterfly computation.

1       11.      The signal bearing media of claim 9, wherein processing the at least one of the  
2 one or more fixed length blocks using the butterfly computation to form the processed  
3 information comprises performing a radix-4 butterfly computation.

1       12.      The signal bearing media of claim 9, wherein processing the at least one of the  
2 one or more fixed length blocks using the butterfly computation to form the processed  
3 information comprises performing a radix-2 butterfly computation and performing a  
4 radix-4 butterfly computation.

1        13.     A method comprising:  
2                forming a transform of an N point signal where N is an integer by a first method if  
3        the logarithm of N to the base four is an integer and N is less than or equal to a particular  
4        value;  
5                forming the transform of the N point signal by a second method if the logarithm  
6        of N to the base four is an integer and N is greater than the particular value; and  
7                forming the transform of the N point signal by a third method if the logarithm of  
8        N to the base four is not an integer, but the logarithm of N to the base two is an integer.

1        14.     The method of claim 13, wherein forming the transform of the N point signal  
2        where N is an integer by the first method if the logarithm of N to the base four is an  
3        integer and N is less than or equal to the particular value comprises:  
4                calculating a fast Fourier transform of the N point signal by processing the N  
5        point signal using one or more radix-4 butterfly computations performed using one  
6        processing unit.

1        15.     The method of claim 13, wherein forming the transform of the N point signal by a  
2        second method if the logarithm of N to the base four is an integer and N is greater than  
3        the particular value comprises:  
4                processing the N point signal in stages;  
5                partitioning the stages into one or more groups; and  
6                processing the one or more groups, after interleaving, by performing a butterfly  
7        computation on information contained in each of the one or more groups.

1        16.     The method of claim 13, wherein forming the transform of the N point signal by a  
2        third method if the logarithm of N to the base four is not an integer, but the logarithm of  
3        N to the base two is an integer comprises:  
4                processing a first stage of the N point signal using a first radix; and  
5                processing remaining stages using a second radix.

1 17. The method of claim 16, wherein processing the first stage of the N point signal  
2 using the first radix comprises calculating a fast Fourier transform of the N point signal  
3 by processing the N point signal using one or more radix-2 butterfly computations  
4 performed using one processing unit.

1 18. The method of claim 16, wherein processing remaining stages using the second  
2 radix comprises using the first method or the second method.

1 19. A system comprising:  
2 a communication unit including an omnidirectional antenna to receive a signal;  
3 a primary information storage unit having a primary storage capacity, the primary  
4 information storage unit included in the communication unit;  
5 a secondary information storage unit to receive a signal stored in the primary  
6 information storage unit and the secondary information storage unit having a secondary  
7 storage capacity, the secondary storage capacity being less than the primary storage  
8 capacity; and  
9 an information processing unit coupled to the primary information storage unit  
10 and to the secondary information storage unit, the information processing unit to receive  
11 the signal from the secondary information storage unit, to process the signal to form a  
12 Fourier transform of the signal, and to store the Fourier transform of the signal in the  
13 primary information storage unit.

1 20. The system of claim 19, wherein the communication unit comprises a cellular  
2 telephone.

1 21. The system of claim 19, wherein the primary information storage unit comprises a  
2 semiconductor memory.

1 22. The system of claim 19, wherein the secondary information storage unit  
2 comprises a magnetic memory.

1 23. The system of claim 19, wherein the information processing unit comprises one or  
2 more computational units to perform a butterfly computation.

1 24. The system of claim 19, further comprising a computer system coupled to the  
2 communication unit.